

26 November 1979

D. L. Scantlebury
Director, Financial and General Management
Studies Division
United States General Accounting Office
Washington, D.C. 20548

Dear Sir:

Enclosed you will find the completed questionnaire contained in your letter of 23 October 1979. I hope you find the information useful.

In analyzing the answers provided in the questionnaire, one qualification should be noted. Applications programming is done in this Agency on quite a decentralized basis. The organization which I represent within CIA is only one, although the largest, applications organization and represents only about 35-40% of the applications work done in the Agency. Subsequently, while the response to questions 5, 8, and 9 represent only my group, the other responses will, in my opinion, roughly apply throughout the Agency.

Should you have any further questions, please feel free to call me directly on [REDACTED]

STATINTL

[REDACTED]
Deputy Director for Applications
Office of Data Processing

Enclosure:
Survey Questionnaire on Applications
Software Maintenance

DD/A/ODP [REDACTED] /23Nov79

STATINTL

Distribution:

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UNITED STATES GENERAL ACCOUNTING OFFICE

WASHINGTON, D.C. 20548



October 23, 1979

Central Intelligence Agency
Proc. Div.
Washington, DC 20505

Dear Sir:

The U.S. General Accounting Office, an agency of the Congress, is currently studying Federal agencies' management of applications software maintenance. As part of our study we are interested in learning of the extent and nature of software and software maintenance at Federal data processing installations. We would also like to obtain the views of knowledgeable Federal data processing professionals on these subjects.

To obtain the needed information and views, we have developed the enclosed questionnaire, which we would like to have completed by ADP managers or senior level staff at your installation.

Questionnaire responses will be reported in summary form. Although we are requesting identifying information, we are doing so solely to enable us to obtain clarifying information, if necessary, and to supply copies of our report to those who request them. Also, we may visit selected installations to augment information on the questionnaire but our intent nonetheless is to present all information obtained in summary form.

We would very much appreciate it if you would return the completed questionnaire in the enclosed envelope within 10 days. If you have any questions, please call Mr. John Womble telephone number: (405) 686-2223 or FTS 732-2223, or Dr. Steven Merritt: (202) 275-6187 or FTS 275-6187.

Thank you for your cooperation.

Sincerely yours,

D. L. Scantlebury

D. L. Scantlebury
Director, Financial and General
Management Studies Division

Enclosures

U. S. GENERAL ACCOUNTING OFFICE

SURVEY OF
APPLICATIONS SOFTWARE
MAINTENANCE

1118
(1-4)

INTRODUCTION

This questionnaire seeks information about Federal agencies' management of their applications software maintenance. The questionnaire should be completed at the installation level by ADP managers or senior staff members knowledgeable about applications software maintenance. If the address to which the questionnaire has been sent is not a data processing installation, please forward it to your organization's data processing division.

Most questions can be answered by simply checking a box or writing in a small amount of information. Where exact answers are not readily available, please provide the best available estimate. If you wish to explain or amplify any answer, please do so at the end of the questionnaire.

The information we ask about the respondent is needed for follow-up purposes. Answers will generally be reported in summary form. Individuals will not be associated with specific answers.

Please return the questionnaire as soon as possible in the envelope provided. If you have any questions, please call Mr. John Womble on (405) 686-2223 or FTS 732-2223, or Dr. Steven Merritt on (202) 275-6187 or FTS 275-6187.

NOTE: In completing this questionnaire, please ignore the numbers in parentheses to the right of a question item; they are included to facilitate keypunching.

RESPONDENT INFORMATION

STATINTL

NAME

Deputy Director for Applications

TITLE

PHONE NUMBER

BUREAU, OFFICE OR COMMAND

ADDRESS

Washington, D.C.

Part I Applications Software Maintenance

DEFINITION

For purposes of this questionnaire, we have defined applications software maintenance as follows: any actions taken after implementation of the software to

- 1) remove defects in the software including
 - a) defects in which the software was programmed to do something other than what the user wanted, and
 - b) defects in which the program logic was faulty with the result that the program did something other than what the programmer intended
- 2) tune the software to make it more efficient (less machine time and/or less core)
- 3) modify or enhance the software to make it perform more end-user functions, including
 - a) functions originally called for in the system design, but not implemented, and
 - b) new functions requested by the user not called for in the original system design
- 4) make other modifications resulting from miscellaneous causes such as the need to interface with other systems, system software changes, etc.

NOTE: We are aware that each agency may define software maintenance differently. Regardless of your agency's definition, please answer our questions in terms of all the functions included in our definition above. This is necessary to ensure consistency in responses.

1. Does your installation have responsibility for any applications software maintenance as defined above? (5)
 1. ☒ Yes
 2. ☐ No (If no, please explain below and skip to question 6.)

Which of the following best describes the extent of your installation's software maintenance responsibilities? (Please check only one.) (6)

1. ☐ Limited - Consists solely of identifying defects, new user requirements, trouble shooting, and installing changes for applications developed by a central agency function outside this installation
2. ☒ Limited maintenance on centrally developed applications, plus maintenance on some locally developed systems
3. ☐ Full maintenance responsibility for all applications run at this installation
4. ☐ Other (Please describe.)

3. Is the applications software maintenance at your installation performed by installation employees, by contractor employees or by a mixture of both? (Please check only one.) (7)

1. ☐ Installation employees do all applications software maintenance
2. ☐ Contractor employees do all the applications software maintenance
3. ☒ Applications software is maintained by a mixture of installation employees and contractor employees
4. ☐ Other (Please describe.)

4. Please show the percentage of total software maintenance (as measured by staff hours) performed at your installation that falls in each of the following categories. Show a percent for each category (even if it is zero percent). Percents shown should add to 100%.

Any actions taken after implementation of the software to:

1. Remove defects in the software, including
 - a) defects in which the software was programmed to do something other than what the user wanted 1 % (8-10)
 - b) defects in which the program logic was faulty with the result that the program did something other than what the programmer intended 5 % (11-13)
2. Tune the software to make it more efficient (less machine time and/or less core) 5 % (14-16)
3. Modify or enhance the software to make it perform more end-user functions, including
 - a) functions originally called for in the system design, but not implemented 10 % (17-19)
 - b) new functions requested by the user not called for in the original system design 60 % (20-22)
4. Make other modifications resulting from miscellaneous causes such as the need to interface with other systems, system software changes, etc. 19 % (23-25)

100 % Total

5. Please estimate the percentages of the following resources' times that are devoted to the software maintenance functions listed in question 4. Please show a percentage for each item even if it is zero.

A. Personnel

Programmer/analyst	<u>98</u> % (26-28)
Operations personnel	<u>0</u> % (29-31)
Administrative personnel	<u>0</u> % (32-34)
Management personnel	<u>2</u> % (35-37)

B. Hardware

CPU time	<u>5</u> % (38-40)
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6. Are the applications programs in use at your installation primarily business applications, primarily scientific applications, or a mixture of both business and scientific applications? (Please check only one.) (41)

1. ☐ Primarily business applications
2. ☐ Primarily scientific applications
3. ☒ A mixture of business and scientific applications
4. ☐ Other (Please describe.)

7. Do most of the application programs in use at your installation run in production for a year or more before being discarded or replaced; do most run for less than a year; is the number running for a year or more about equal to the number that run for less than a year? (Please check only one.) (42)

1. ☒ Most run for a year or more
2. ☐ Most run for less than a year
3. ☐ About as many last a year or more as last less than a year

8. Next we are interested in the programming languages used in your installation. Please state for each of the languages listed below the number of application programs in that language currently in use in your installation and the average production life in years at your installation of the application programs in that language.

LANGUAGE	No. of programs whose source code is in the language	Average length of production life of programs in the language in years
COBOL	1 / 1 / 1 / 0 / 0 / (43-47)	1 / 8 / (48-49)
FORTRAN	1 / 1 / 5 / 0 / 0 / (50-54)	1 / 4 / (55-56)
PL/I	2 / 0 / 0 / 0 / 0 / (57-60)	1 / 7 / (61-62)
BASIC	1 / 1 / 4 / 0 / 0 / (63-66)	1 / 1 / (67-68)
ALGOL	1 / 1 / 1 / 1 / 1 / (69-72)	1 / 1 / (73-74)
ASSEMBLY*	1 / 2 / 0 / 0 / 0 / (5-8)	1 / 0 / (9-10)
CMS-1/CMS-2	1 / 1 / 1 / 1 / 1 / (11-14)	1 / 1 / (15-16)
PASCAL	1 / 1 / 1 / 1 / 1 / (17-20)	1 / 1 / (21-22)
RPG	1 / 1 / 1 / 5 / 0 / (23-26)	1 / 5 / (27-28)
LISP	1 / 1 / 1 / 1 / 1 / (29-32)	1 / 1 / (33-34)
SIMSCRIPT	1 / 1 / 1 / 1 / 1 / (35-38)	1 / 1 / (39-40)
GPSS	1 / 1 / 1 / 1 / 1 / (41-44)	1 / 1 / (45-46)
DYNAMO	1 / 1 / 1 / 1 / 1 / (47-50)	1 / 1 / (51-52)
SNOBOL	1 / 1 / 1 / 1 / 1 / (53-56)	1 / 1 / (57-58)
SCORE	1 / 1 / 1 / 1 / 1 / (59-62)	1 / 1 / (63-64)
EASY-TRIEVE	1 / 1 / 1 / 1 / 1 / (65-68)	1 / 1 / (69-70)
DYL-260	1 / 1 / 1 / 1 / 1 / (71-74)	1 / 1 / (75-76)
		2(80) Dupl (1-4)
DATA BASE LANGUAGES	1 / 8 / 0 / 0 / 0 / (5-8)	1 / 6 / (8-10)
OTHER (Specify)	1 / 1 / 1 / 1 / 1 / (11-14)	1 / 1 / (15-16)

* Assembly languages include BAL, EASYCODER, AUTOCODER, GMAP, COMPASS, etc.

9. Please write in the age (i.e., how long it has been in production) of the oldest application program in use at your installation. Write in your estimate.

12 years (17-18)

10. In what language is the oldest application program in use at your installation written? (Please check only one.) (19)

1. ☐ COBOL 2. ☒ Assembly language* 3. ☐ FORTRAN 5. ☐ Other (Please specify.)

* ASSEMBLY LANGUAGES INCLUDE BAL, EASYCODER, AUTOCODER, GMAP, COMPASS, etc.

11. Which, if any, of the following software tools and techniques are in use at your installation? (Please check all that apply.)

<u>Tool</u>	<u>Technique</u>
1. <input checked="" type="checkbox"/> Automated documentation (20)	1. <input checked="" type="checkbox"/> Code arrangement (28)
2. <input type="checkbox"/> Source text manipulation (21)	2. <input type="checkbox"/> Descriptive documentation (29)
3. <input checked="" type="checkbox"/> Program optimization (22)	3. <input type="checkbox"/> Performance documentation (30)
4. <input checked="" type="checkbox"/> Aids built into compilers (23)	4. <input checked="" type="checkbox"/> Embedded documentation (31)
5. <input type="checkbox"/> Special programming languages compilers (24)	5. <input checked="" type="checkbox"/> Programming practices standards (32)
6. <input checked="" type="checkbox"/> Preprocessors (25)	6. <input checked="" type="checkbox"/> Re-use of already written code (33)
7. <input type="checkbox"/> Program performance evaluation (26)	7. <input type="checkbox"/> Quality assurance organization/management (34)
8. <input type="checkbox"/> Design language (27)	8. <input checked="" type="checkbox"/> Design (35)
	9. <input type="checkbox"/> Programming organization/management (36)

12. Does your installation have an on-going (regular basis) effort to do optimization on application programs to reduce the machine costs of running them? (Please check only one.) (37)

1. ☒ Yes 2. ☐ No 3. ☐ Not sure

13. Are cost accounting procedures in effect at your installation to capture personnel, hardware, and overhead cost associated with application software maintenance as defined in this questionnaire? (Please check only one.) (38)

1. ☒ Yes 2. ☐ No 3. ☐ Not sure

14. If yes, are reports showing these costs regularly produced? (Please check only one.) (39)

1. ☒ Yes 2. ☐ No 3. ☐ Not applicable - no procedures

Please attach a sample sheet from such a report showing cost elements reported, if one is available.

Part III Opinions and Views

15. Based upon your experience, do you believe that application software developed by contractors requires more or less maintenance than application software developed in-house? (Please check only one.) (40)

1. ☐ Contractor-developed software requires more maintenance
 2. ☐ Contractor-developed software requires about the same amount of maintenance
 3. ☐ Contractor-developed software requires less maintenance
 4. ☒ No opinion

16. In your opinion, which, if any, of the following actions would result in the greatest reduction in the size of the government's applications software maintenance effort? (Please check only one.) (41)

1. ☐ Better definition of user requirements in the system development stage
2. ☐ Better definition of user requirements for modifications to existing software
3. ☐ Use of software tools and techniques in system development (structured design, structured coding, etc.)
4. ☐ Providing better tools and techniques for maintenance programmers (such as interactive terminals, text editors, and program analysis tools, etc.)
5. ☐ More thorough testing of applications programs before the system is released to production
6. ☐ Eliminating unnecessary changes requested by users
7. ☐ Nothing-such a reduction is not possible
8. ☒ Other (Please specify.)

Prototyping

17. Does the definition of software maintenance used in this questionnaire generally agree with your agency's definition? (42)

1. ☒ Yes
2. ☐ No
3. ☐ Not sure

18. If not, briefly state your agency's definition. (43)

19. If you have any additional comments on any of the questions in the questionnaire or on any other aspect of software maintenance, please provide them in the space below. If you would prefer to convey your views separately, please write:

Mr. John Womble
U. S. General Accounting Office
200 N. W. 5th, Room 348
Oklahoma City, Oklahoma 73102

or

Dr. Steven Merritt
U. S. General Accounting Office
441 G Street, N.W.
Washington, D. C. 20548

Attn: FGMSD, Room 6011

or call them. Their telephone numbers are listed on page 1 of the questionnaire. Thank you for your cooperation.



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UNITED STATES GENERAL ACCOUNTING OFFICE

WASHINGTON, D.C. 20548



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11/16
STATINTL

October 23, 1979

Central Intelligence Agency
Proc. Div.
Washington, DC 20505

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Sincerely yours,

D. L. Scantlebury
Director, Financial and General
Management Studies Division

Enclosures

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TRANSMITTAL SLIP		DATE
TO: D/ODP - <i>initialed - 11/28</i>		
ROOM NO. 2D00	BUILDING Hdqs.	
REMARKS: <i>to OLC on 11/28</i>		
FROM: DD/A/ODP		
ROOM NO. 2D42	BU 	
FORM NO. 241 1 FEB 55		REPLACES FORM 36-8 WHICH MAY BE USED. (47)

STATINTL